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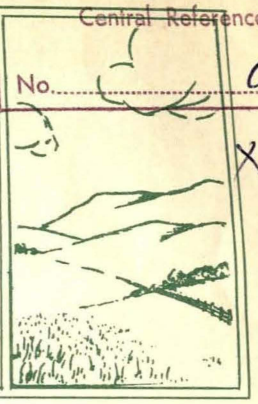
STEPHEN N. WYCKOFF, Director



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PINUS: POLLINATION BAG CONSTRUCTION

By A. R. Liddicoet

In plant breeding work different species usually require at least minor differences in treatment. It is not surprising, therefore, to learn that specific techniques are used in the breeding of pine trees. Methods and specialized equipment have been developed by the Institute of Forest Genetics over a period of twenty years, during which time many variations of numerous methods have been tried with more or less success. In an effort to help others who are interested in the breeding of pines, techniques that have proved successful are being published by the California Forest and Range Experiment Station. This note describes the construction of the pollination bag used by the Institute.1/

1/ Other recent publications include:

Pinus: Methods of controlling pollination in the Sierra Nevada, by W. C. Cumming and F. I. Righter. Manuscript in process of publication by U. S. Department of Agriculture.

Trees in the Eddy Arboretum, by R. H. Weidman. Research Note No. 53, California Forest and Range Experiment Station. Berkeley. April 1947.

Dates and places of pollen collection by the Institute of Forest Genetics, by John W. Duffield. Research Note No. 54. September 10, 1947.

Pinus: Propagation of experimental stock, by A. R. Liddicoet and E. F. Kimbrough. Research Note No. 56. October 15, 1947.

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Purpose of the Bag

In controlled pollination of pines a pollination bag is used to cover the female flowers, or conelets, to protect them from undesired pollen. The bags must be constructed of material that will exclude all air-borne pollen, yet will be porous enough to allow moisture transpired by pine needles to be dissipated. The bag material must allow penetration of a hypodermic syringe needle to introduce the pollen and must permit the hole made by the needle to be readily closed. It is also desirable that the bag have a window for examining the conelets without removing the bag.

Material. - The materials used in making the Institute bag are as follows:

Untreated 10- or 12- ounce white canvas. Twenty-eight-inch width is preferred because this width places selvedge edges at the open end of the bag. Bags made of 10-ounce canvas are preferable. They are lighter, easier to use, and cause less damage to young shoots than the more durable 12-ounce material.

Liquid fabric cement (weatherproof) and thinner. (One gallon will seal 250 bags).

No. 1 binding staples ($\frac{1}{2}$-inch wide).

Cellulose acetate plastic windows, 4 x 5 inches, .01 inch thick.

Cement for cellulose acetate. (One quart will cement 225 windows).

Cutting and Cementing. – A cardboard template (fig. 1) is used as a pattern to mark out the bag, which is 8 inches wide and 14 inches long when completed.

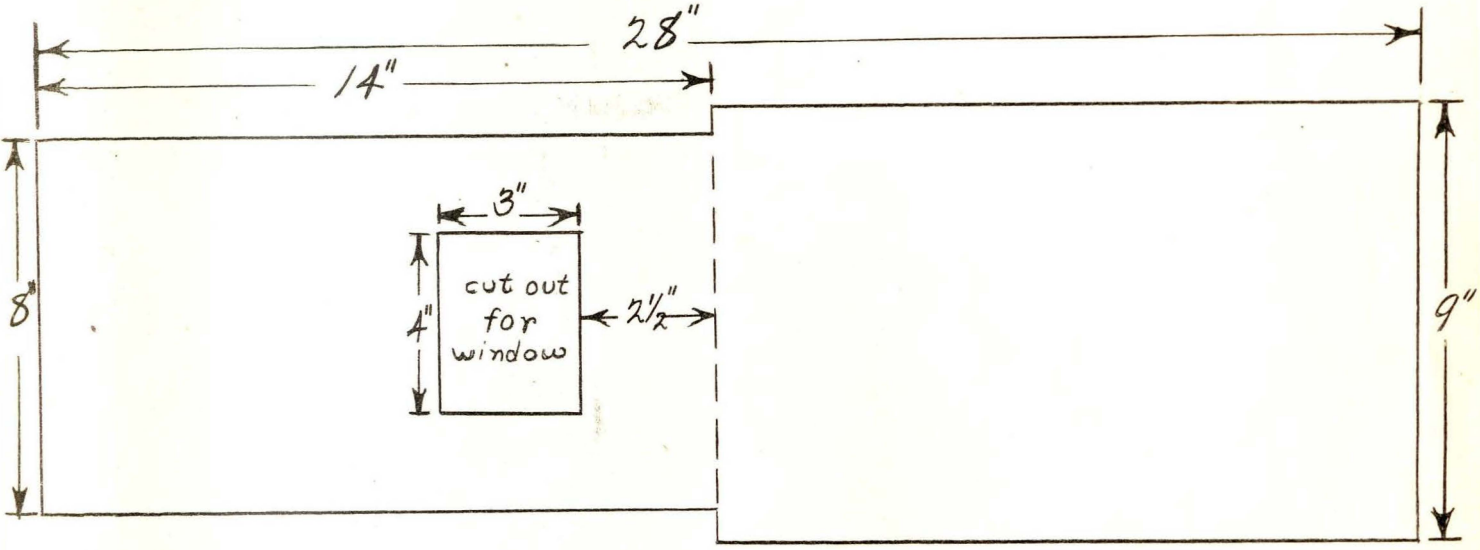

Figure 1. – Pattern for pollination bag template. (Not to scale.)

After the bag is cut by use of a single-edge razor blade or shears, the window half of the canvas is folded over, on the broken line of figure 1, leaving a half-inch margin beyond each edge of the 8-inch side. Liquid fabric cement is applied liberally to these margins, which are then folded over and sealed by running a finger along the lap. The newly glued bags are piled under a board weighted with about ten pounds. Such a weight is sufficient to press approximately 25 bags. After twenty-four hours the bags are inspected. If seams failed to adhere, they are re-cemented. A binding staple is placed in each corner with a No. 1 stapler to strengthen the corners.

Installing the Windows. – The windows are cut from standard 20- by 50-inch cellulose acetate sheets, each window being 4 by 5 inches so that it extends one-half inch on each side of the opening in the canvas. Cement is applied to the edge of the fabric with a half-inch brush. The window is placed in position, and sealed by pressure with the finger. The bag is again weighted as for cementing and left for twelve hours or more.

When the bag is completed, a piece of cotton batting is placed inside the bag (for padding around the branch where the bag is to be tied), the open end of the bag is sealed with gummed tape (fig. 2), and the bag is sterilized - as far as pollen is concerned - in an electric oven at 80° C for 24 hours.

This method of bag construction requires approximately 15 man-minutes to complete one bag. Under average treatment a bag will last from 10 to 15 years, except for the windows, which must be replaced in from 1 to 5 years. When replacing a window, if the defective one cannot be peeled from the canvas, a little acetone applied to the seams will help loosen the window. After each period of use the inside of the bag is cleaned with a small vacuum cleaner, and windows and seams are inspected for defects. If there are no defects, the bag is ready to have a piece of cotton placed inside and the open end sealed. When sterilized, the bag is again ready for use.

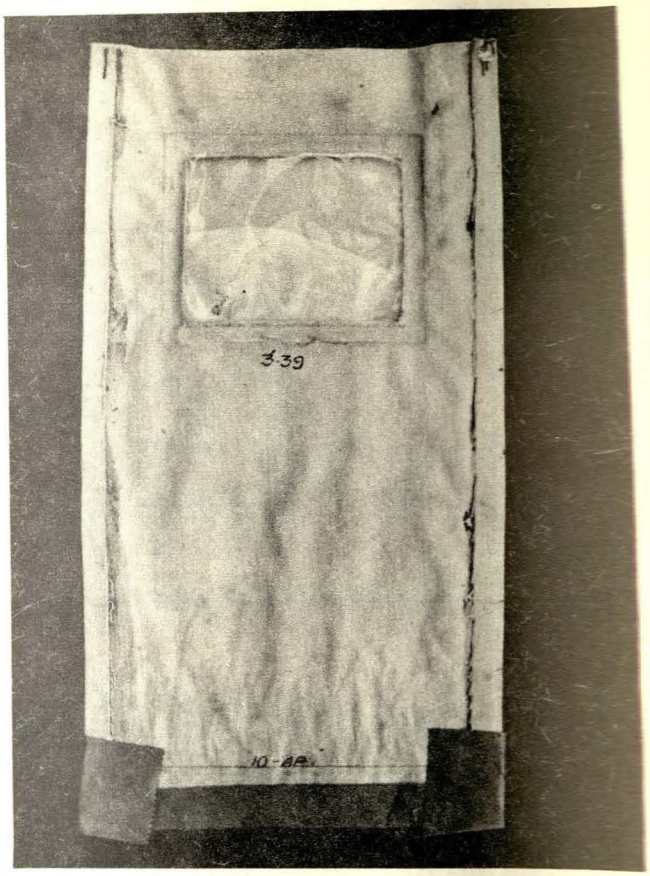

Figure 2. - Completed pollination bag sealed with gummed tape at open end.